

*B2* conversion according to the present invention include  $Y_2O_3:Eu$ ,  $Y_2O_2S$  doped with Eu and/or Tb, ZnS doped with Au, Al, Cu or combinations thereof as well as ZnS doped with Ag or Cl,  $SrGa_2S_4$  doped with Eu and/or Ce,  $Y_3(Ga,Al)_5O_{12}$ , i.e.,  $Y_3Ga_xAl_yO_{12}$  where x and y are 0 to 5.0 and x+y is 5 doped with Tb or Cr,  $Zn_2SiO_4:Mn$  and  $Y_2SiO_5$  doped with Tb or Ce.

Please amend the paragraph beginning at page 48, line 19, as follows:

*B3* Zinc sulfide can be produced from a precursor solution including thiourea and zinc nitrate.  $Y_3(Ga,Al)_5O_{12}$  can advantageously be produced from a solution comprising all metal salts or can include particulate alumina.

Please amend the paragraph beginning at page 48, line 26, as follows:

*B4* The solution is preferably not saturated with the precursor to avoid precipitate formation in the liquid. The solution preferably includes, for example, sufficient precursor to yield from about 1 to 50 weight percent, such as from about 1 to 15 weight percent, of the phosphor compound. That is, the solution concentrations are measured based on the equivalent weight percent of the phosphor product. Water can be added to the liquid during processing to maintain the precursor concentration below a predetermined value. The final particle size of the phosphor particles is also influenced by the precursor concentration. Generally, lower precursor concentrations in the liquid feed will produce particles having a smaller average size.

Please amend the paragraph beginning at page 60, line 13, as follows:

*B5* The coating, either particulate or non-particulate, can also include a pigment or other material that alters the light characteristics of the phosphor. Red pigments can include compounds such as the iron oxides ( $Fe_2O_3$ ), cadmium sulfide compounds ( $CdS$ ) or mercury sulfide compounds ( $HgS$ ). Green or blue pigments include cobalt oxide ( $CoO$ ), cobalt aluminate ( $CoAl_2O_4$ ) or zinc oxide ( $ZnO$ ). Pigment coatings are capable of absorbing selected wavelengths of light leaving the phosphor, thereby acting as a filter to improve the color contrast and purity. Further, a dielectric coating, either organic or inorganic, can be used to achieve the appropriate surface charge characteristics to carry out deposition processes such as electrostatic deposition.

Please amend the paragraph beginning at page 67, line 2 as follows:

*B6*  
Ink-jet printing is another method for depositing the phosphor powders in a predetermined pattern. The phosphor powder is dispersed in a liquid medium and dispensed onto a substrate using an ink jet printing head that is computer controlled to produce a pattern. The phosphor powders of the present invention having a small size, narrow size distribution and spherical morphology can be printed into a pattern having a high density and high resolution. Other deposition methods utilizing a phosphor powder dispersed in a liquid medium include micro-pen or syringe deposition, wherein the powders are dispersed such as by using a dispersing agent and applied to a substrate using a pen or syringe and are then allowed to dry.

Please amend the paragraph beginning at page 69, line 20 as follows:

*b1*  
A CRT display device is illustrated schematically in Fig. 37. The device 1002 includes 3 cathode ray tubes 1004, 1006 and 1008 located in the rear portion of the device.

The cathode ray tubes generate electrons, such as electron 1010. An applied voltage of at least about 5 kV, typically at least about 20 kV, such as 20 to 30 kV accelerates the electrons toward the display screen 1012. In a color CRT, the display screen is patterned with red (R), green (G) and blue (B) phosphors, as is illustrated in Fig. 38. Three colored phosphor pixels are grouped in close proximity, such as group 1014, to produce multicolor images. Graphic output is created by selectively directing the electrons at the pixels on the display screen 1012 using, for example, electromagnets 1016. The electron beams are rastered in a left to right, top to bottom fashion to create a moving image. The electrons can also be filtered through an apertured metal mask to block electrons that are directed at the wrong phosphor.

Please amend the paragraph beginning at page 71, line 9, as follows:

*b8*  
CRT's typically operate at high voltages such as from about 20 kV to 30 kV.

Phosphors used for CRT's should have high brightness and good chromaticity. Phosphors which are particularly useful in CRT devices include ZnS:Cu or Al or combinations thereof for green, ZnS:Ag, Au or Cl or combinations thereof for blue and Y<sub>2</sub>O<sub>2</sub>S with 0.01 to 10

*B8*

atomic percent Eu, Tb or combinations thereof for red ZnS preferably includes from about  $10^{-5}$  to  $10^{-3}$  gram-atoms per mole of the activator ion. The phosphor particles can advantageously be coated in accordance with the present invention to prevent degradation of the host material or diffusion of activator ions. Silica or silicate coatings can also improve the rheological properties of the phosphor slurry. The particles can also include a pigment coating, such as particulate  $\text{Fe}_2\text{O}_3$ , to modify and enhance the properties of the emitted light.

*B9*

Please amend the paragraph beginning at page 72, line 21, as follows:

The high electron voltages and small currents traditionally required to activate phosphors efficiently in a CRT device have hindered the development of flat panel displays. Phosphors for flat panel displays such as field emission displays must typically operate at a lower voltage, higher current density and higher efficiency than phosphors used in existing CRT devices. The low voltages used in such displays, such as not greater than about 5 kV, result in an electron penetration depth in the range of several micrometers down to tens of nanometers, depending on the applied voltage. Thus, the control of the size and crystallinity of the phosphor particles is critical to device performance. If large or agglomerated powders are used, only a small fraction of the electrons will interact with the phosphor. Use of phosphor powders having a wide size distribution can also lead to non-uniform pixels and sub-pixels, which will produce a blurred image.

*B10*

Please amend the paragraph beginning at page 74, line 2 as follows:

Phosphors which are particularly useful for FED devices include thiogallates such as  $\text{SrGa}_2\text{S}_4:\text{Eu}$  for green,  $\text{SrGa}_2\text{S}_4:\text{Ce}$  for blue and  $\text{ZnS}:\text{Ag}$  or  $\text{Cl}$  or combinations thereof for blue.  $\text{Y}_2\text{O}_3:\text{Eu}$  can be used for red.  $\text{ZnS}:\text{Ag}$  or  $\text{Cu}$  or combinations thereof can also be used for higher voltage FED devices.  $\text{Y}_2\text{SiO}_5:\text{Tb}$  or  $\text{Eu}$  can also be useful. For use in FED devices, these phosphors are preferably coated, such as with a very thin metal oxide coating, since the high electron beam current densities can cause breakdown and dissociation of the sulfur-containing phosphor host material. Dielectric coatings such as  $\text{SiO}_2$  and  $\text{Al}_2\text{O}_3$  can be used. Further, semiconducting coatings such as  $\text{SnO}$  or  $\text{In}_2\text{O}_3$  can be particularly advantageous to absorb secondary electrons.